

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

MR. EVAN SPICER, chairman of the London County Council, will distribute the prizes and certificates at the annual conversazione of the Northampton Institute, Clerkenwell, E.C., on Friday, January 25.

THE annual general meeting and dinner of the Central Technical College Old Students' Association will be held at the Trocadero Restaurant, Piccadilly Circus, W., on Saturday, February 23. Applications for tickets should be sent to Mr. R. J. Caldwell, 40 Salehurst Road, Crofton Park, London, S.E.

THE department of archaeology of the University of Pennsylvania has received a gift of 800*l.* from Mr. Eckley Brinton Cox, jun. The donor has specified that of the gift 1720*l.* a year shall be paid for five years to the new curator of the department of Egyptology, Dr. D. Randall MacIver, who is now in Egypt, where he has been instructed to begin excavations.

MR. SIDNEY WELLS, principal of the Battersea Polytechnic, and a member of the consultative committee of the Board of Education, has been appointed Director-General of the Department of Agriculture and Technical Education for Egypt. This department has been created in order to develop, organise, and control technical education in Egypt generally. It will be concerned with all the Government educational institutions of every kind, and also with the non-Government technical institutions.

A PRIVATE donation has enabled the Meteorological Committee to invite applications for an appointment as reader in dynamical meteorology. The readership will be of the annual value of 350*l.*, and will be tenable for three years at any British university that may be approved for the purpose and affords the required facilities. The duty of the reader will be primarily to promote the science of meteorology by mathematical investigation, and he will be expected to give annually a short course of about twelve lectures. Further details may be obtained from the Director of the Meteorological Office, 63 Victoria Street, London, S.W.

THE annual report of the council of University College, London, has just been issued. The number of students in the college for the session 1905-6 was 1396; of these, 134 were post-graduate and research students. The report contains particulars of the benefactions received during the year, which include valuable grants from the Drapers' Company, from the Chadwick trustees, and the sum of 2500*l.* collected by the Jewish Historical Society for the maintenance of the Mocatta library. The report also contains a summary of the research work done during the past session; the lists of the publications by professors, assistant teachers, and senior students occupy fourteen pages. The steps that have been taken for the union of the college and the University of London are summarised in the report. On January 1 of the present year the college ceased to be a school of the University, and became incorporated with it, thus realising the aims of those who in 1826 founded it. It is the first college to be thus incorporated with the University, and it is understood that its example will be followed by King's College. Important additions have been made during the past year to the departments of physics and chemistry, and a plan has been worked out for the rearrangement of many of the college departments. This will be possible when the new buildings for the school of advanced medical studies, now in course of erection by the generosity of Sir Donald Currie, and the new buildings of University College School at Hampstead, are completed.

SOCIETIES AND ACADEMIES.

LONDON.

Mathematical Society. January 10.—Prof. W. Burnside, president, in the chair.—An exhibition of models of four-dimensional figures was made by Mrs. A. Stott. The models are sections by three-dimensional flat spaces of the six regular hypersolids of a flat space of four dimensions. The sections are in general polyhedra; and corresponding

faces of different polyhedra, forming a series of sections of the same regular hypersolid, are coloured identically in order to show the relations between the different sections. Other models show the grouping about a point of the regular hypersolids which have the space-filling property.—The uniform convergence of Fourier's series: Dr. E. W.

Hobson. The coefficients of the Fourier's series determined by an assigned function are defined by integrals, which may be determinate when the extended definition of integration introduced by Lebesgue is used, although they have no meaning when integration is interpreted in accordance with Riemann's definition. It is shown in the paper that whenever the coefficients of the Fourier's series, determined by a function $f(x)$ in the interval $\pi > x > -\pi$, are, in this sense, determinate, and the function $f(x)$ is continuous throughout a sub-interval included in this interval, and this function is of limited total fluctuation in the whole interval, the Fourier's series so determined converges uniformly in the sub-interval.—Hyper-even numbers and Fermat's numbers: Lieut.-Colonel A. **Cunningham.** The hyper-even numbers are formed in

sequence as 2^n , 2^{2^n} , $2^{2^{2^n}}$, and so on. Fermat's numbers are of the form $2^{2^n} + 1$. The numbers ξ which are such that $2\xi \equiv 1 \pmod{m}$ are the *Haupt-exponents* of 2 for the modulus m . The paper is occupied with tracing the relations which connect together the residues of successive hyper-even numbers, the uneven factors of the *Haupt-exponents*, and the Fermat's numbers.—Riemann's hypergeometric function: Dr. E. W. **Barnes.** It is shown how the differential equation of the hypergeometric series, and likewise that of Riemann's function, can be solved respectively by means of certain contour integrals, and how the known solutions can all be obtained by deforming the contour. The relations between the various forms of solution, which hold in the neighbourhoods of the singular points, can be traced very simply by means of the general formulæ. The method is applied to obtain asymptotic approximations to zonal harmonics in the case where the index increases indefinitely.—Partial differential equations of the second order, having integral systems free from partial quadratures: Prof. A. R. **Forsyth.** The integral systems discussed are those in which three variables x, y, z are expressed in terms of two parameters u, v , an arbitrary function of u , an arbitrary function of v , and differential coefficients of these two functions. The object of the paper is to determine the forms of the differential equations which possess integrals of the type in question, and to construct the integrals of such equations.—The singular points of certain classes of functions of several variables: G. H. **Hardy.** The theory of the singularities of functions of one variable, defined by Taylor's series, may be said to be tolerably complete, but in the case of functions of several variables little advance has been made. The purpose of this paper is, by the consideration of a few of the simplest cases, to make a beginning with the problem of classifying types of power series in two or more variables according to the nature of their singularities.—The singularities of functions defined by Taylor's series: G. H. **Hardy.**—Asymptotic approximation to integral functions of zero order: J. E. **Littlewood.**—The reducibility of covariants of binary quatics of infinite order: P. W. **Wood.**—The forms of the stream lines due to the motion of an ellipsoid in infinite fluid, frictionless or viscous: Dr. T. **Stuart.**

Geological Society, December 19, 1906.—Sir Archibald Geikie, Sec.R.S., president, in the chair.—The post-Cretaceous stratigraphy of southern Nigeria: J. **Parkinson.** In this paper, which is a first attempt to outline the sequence of the later deposits of southern Nigeria (now including the colony of Lagos), a series of beds is described from four localities—three from the western side of the Niger, and one around Calabar near the Kameruns frontier. The alluvium of the river-beds and the lower terraces are referred to, and the succeeding sediments grouped under three heads.—The geology of the Oban Hills (southern Nigeria): J. **Parkinson.** The country described in this paper comprises some 1800 square miles of the Eastern Province of southern Nigeria, adjacent to

the Kameruns frontier. The rocks are crystalline, principally gneisses and schists, with later granites, pegmatites, and basaltic dykes, surrounded on the north, west, and south by Cretaceous sediments. For purposes of description the series is divided under nine headings, according to locality and petrographical character; and it is concluded that, neglecting the basaltic dykes, two broad groups may be distinguished—the one characterised by the presence, the other by the absence, of foliation. In the former the foliation tends to be lost, giving a passage between types which petrographically are acid orthogneisses and granites.—The crystalline rocks of the Kukuruku Hills (Central Province of southern Nigeria): J. **Parkinson**. In this paper a short account is given of the crystalline rocks found in the Central Province of southern Nigeria, between the station of Ifon (north of Benin City) and the northern Nigerian frontier. The rocks fall under two heads:—(a) a group of gneisses, and (b) a group of schists.

Royal Microscopical Society, December 19, 1906.—Dr. D. H. Scott, F.R.S., president, in the chair.—Microscopic study of strain in metals: F. **Rogers**. The author described the nature of the fatigue of steels which is brought about by submitting them to alternating stresses of a certain magnitude. The nature of the effects in the ferrite of steels is different from that in soft iron, and the effects in pearlite depend upon the type of pearlite. An important difference exists between steels as rolled, or annealed below about 750° C., and steels annealed at higher temperatures, *i.e.* more or less overheated. In the former, the outcrops of surfaces upon which slip has repeatedly occurred are very numerous, short and crooked, and the surface parallel to the direction of stress becomes ruffled. In the latter type, the outcrops are fewer, less crooked, and longer, and the surface is practically unruffled. A relation is found to exist between the ruffling and the Lüders's lines which are found upon statically-strained pieces, and this leads to the theory that specimens of the "normal" group endure fatigue better than "overheated" specimens, because the permanent and injurious microscopic strains are more minutely subdivided and uniformly distributed in the former than in the latter. There is a stage in the life of a piece of steel enduring fatigue, after which, though it is far short of final rupture, annealing is futile, if not actually harmful. Pieces in this stage if heated to 250° C. or higher, and then fatigued to rupture, show heat-tint marks on the ultimate fracture, which map out the portion of fracture which was sufficiently open at the time of heating for air to enter.

PARIS.

Academy of Sciences, January 7.—M. A. Chauveau in the chair.—The distillation of alloys of silver and copper, silver and tin, and silver and lead: Henri **Moissan** and Tosio **Watanabe**. Alloys of the above-named metals were heated under comparable conditions in the electric furnace, the current being maintained at 500 amperes at 110 volts. The original alloy was analysed, and also the ingot remaining in the graphite crucible after the heating. It was found that the metal most easily volatilised was lead, followed by silver, copper, and tin, tin having the highest boiling point of the four. The results are in general agreement with the experiments of Krafft on the distillation of small quantities of metals in a kathode vacuum.—The results of the micrometric measurements made during the eclipse of August 30, 1905, at Roquetas and at Saint Genis Laval: Jean **Merlin**. The value adopted by Newcomb for the constant of lunar parallax is not appreciably in error, and a better value cannot be deduced from the above observations. A certain number of the relative positions of the sun and moon given in the *Connaissance des Temps* require correction.—A theorem of Heine and a theorem of Borel: A. **Schoenflies**.—Turbines with a flexible axis: L. **Lecornu**. In high-speed impact turbines of the Laval type there are certain advantages connected with the use of a flexible axis. The present paper is concerned with the effects of this flexible axis upon the movements of the centre of gravity of the system, taking into account the small variations of the angular velocity of the turbine disc.—The theory of the magnetic properties of iron beyond the temperature of

transformation: Pierre **Weiss**.—The measurement of the radio-chromometric degree by the electrostatic voltmeter in the utilisation of the Röntgen rays in medicine: J. **Bergonié**. The voltage of the Crookes's tubes being measured by an electrostatic voltmeter indicating up to 60,000 volts, it was found that whatever the intensity of the current traversing the tube, if the voltage measured by the voltmeter was kept constant, the rays emitted by the tube are always sensibly of the same radio-chromometric degree. For increased voltages of the tube the rays become more penetrating, the variable intensities of current passing through the tube being without effect. Finally, for tubes of different patterns, unequally used, and carrying different intensities of current, provided that the voltages are kept equal the radio-chromometric degree of each is the same.—The ultra-violet phosphorescent spectrum of fluorspar. The variations of the phosphorescent spectrum of the same element in the same diluent: G. **Urban** and C. **Scal**. The phosphorescence spectrum of an element cannot be considered as constant, but depends on the proportions in which it is present in the diluting medium.—The chlorination of organic compounds in the presence of thallous chloride: V. **Thomas**. The results obtained by the substitution of chloride of thallium for ferric chloride as a catalytic agent in chlorination are not essentially different in the two cases, complex mixtures being found.—The alkaline reduction of *p*- and *m*-nitrobenzophenone: P. **Carré**. The complete reduction with zinc dust and caustic soda is not possible without affecting the ketonic group; the mixture of azo- and azoxybenzophenone resulting from this reduction furnished *p*-hydrazobenzophenone on treatment with ammonium hydrosulphide.—The use of polarised light for the detection under the microscope of starches composed of rice and maize in wheat flour: G. **Gastine**. An improvement of a method proposed in an earlier paper.—Fluorine in mineral waters: P. **Carles**. The author has improved his method for the detection of traces of fluorine in mineral waters, and gives approximate determinations of the amounts present in ninety-three waters of different origin.—Artificial growths: Stéphane **Leduc**. An account of the influence of the medium in which the artificial cells are produced.—The influence of temperature and the hygrometric state of the surrounding atmosphere on the preservation of eggs: M. **de Loverdo**. The most favourable conditions for the preservation of eggs are a temperature kept exactly at -1° C., and a hygrometric state as near as possible to 78 per cent. saturated.—The annelids collected by the French Antarctic Expedition: Ch. **Gravier**.—The origin of the centrosome: J. **Kunstler**.—The regulation of the nycthemeral cycle of temperature and its inversion in the aged: Ed. **Toulouse** and H. **Piéron**.—The Cretaceous strata of the eastern Atlas in Morocco: W. **Kilian** and Louis **Gentil**.—The value of the magnetic elements at the Val-Joyeux Observatory on January 1: Th. **Moureaux**.

NEW SOUTH WALES.

Royal Society, November 7, 1906.—Prof. T. P. Anderson Stuart, president, in the chair.—Notes on some native tribes of Australia: R. H. **Mathews**. The author reproduced some information he had collected during many years past among the aborigines of different portions of the continent respecting their sociology, laws relating to food, methods of avenging deaths, and so on. He also briefly touched upon their language, and some curious beliefs held by the natives concerning metempsychosis, or re-incarnation of souls.—Note on the Silurian and Devonian rocks occurring to the west of the Canoblas Mountains, near Orange, New South Wales: C. A. **Süssmich**. The area referred to comprises a large portion of the parish of Barton and a small portion of the parish of Bowan, county of Ashburnham, and is about fifteen miles southwest from Orange.

CAPE TOWN.

South African Philosophical Society, November 28, 1906.—Dr. J. C. Beattie, president, in the chair.—Notes on the morphology and biology of *Hydnora africana*, Thunb.: Dr. **Mariloth**. The genus *Hydnora* comprises several species (about seven), which are confined to the African continent. They are all parasites which grow on

the roots of different shrubs and trees. The species which forms the subject of this paper, viz. *Hydnora africana*, uses the common milkbush of the karroo and karroid regions of the interior, viz. *Euphorbia mauritanica*, as its host. It is in the structure of the flower that the author has observed some organ which has hitherto escaped the attention of botanists. Each of the three segments of the perianth bears a large snow-white body on its inner side, while the remainder of the inner surface of the flower is of a bright flesh colour. These three white bodies are not mentioned in any existing description of *Hydnora*.—Examination of the validity of an approximate solution of a certain velocity equation: Prof. A. Brown. The question here considered is the part played by the initial value of $y(\lambda)$ in the solution of the equation

$$\frac{dy}{dt} = a_1 y + a_2 y^2 + a_3 y + \dots$$

It is commonly assumed that, for a small initial value of y , the method of successive approximation is applicable, the proviso being sometimes made that the value of v , so obtained, be also small. This assumption is shown in the paper to be not necessarily correct, or in certain cases to lead to a rapid approximation when correct.—List of Natal plants: J. Medley Wood.

DIARY OF SOCIETIES.

THURSDAY, JANUARY 17.

ROYAL SOCIETY, at 4.30.—The Natural and Induced Resistance of Mice to the Growth of Cancer: Dr. E. F. Bashford, J. A. Murray, and Dr. W. Cramer.—On the Pathology of the Dropsy produced by Obstruction of the Superior and Inferior Venæ Cavæ and the Portal Vein; Preliminary Communication: Dr. C. Bolton.—Observations on the Life-history of *Adelæa ovata*, Aimé Schneider; with a Note on a New Gregarine from the Gut of *Lithobius forficatus*: C. C. Dobell.

CHEMICAL SOCIETY, at 8.30.—The Relation between Absorption Spectra and Optical Rotatory Power, Part i., The Effect of Unsaturation and Stereo-isomerism: A. W. Stewart.—Organic Derivatives of Silicon, Part ii., The Synthesis of Di-ethyl, Propyl Benzyl Silicic, its Sulphonation, and the Resolution of the Sulphonic Derivatives into Optically Active Compounds: F. S. Kipping.—The Association of Phenols in the Liquid Condition: J. T. Hewitt and T. F. Winnill.—A New Mercuric Oxichloride: J. T. Hewitt.—Aromatic Selenonium Bases: S. Smiles and T. P. Hilditch.—The Relation of Colour and Fluorescence to Constitution: A. G. Green.—The Constitution of Silver Nitrite, a Correction: E. Divers.—Preparation of Chromyl Chloride: F. D. Law and F. M. Perkin.—Tetraketopiperazine: A. T. de Moulpied and A. Rule.

ROYAL INSTITUTION, at 3.—Recent Advances in the Exploration of the Atmosphere: Dr. W. N. Shaw, F.R.S.

LINNEAN SOCIETY, at 8.—*Platanthera chlorantha*, Custor, var. *tricalcarata*: W. Botting Hemsley, F.R.S.—*Acanthaceae* of Insular Malaya: the late Mr. C. B. Clarke, F.R.S.—A Freshwater Isopod from Calcutta: Rev. T. R. R. Stebbing, F.R.S.

INSTITUTION OF MINING AND METALLURGY, at 8.—Some Sampling Results: E. H. Garthwaite.—The Assay of Silver Bullion by Volhard's Method: E. A. Smith.—Water Skip with Automatic Discharge: W. R. Francis.—Breaking Piece for a Swinging-Jaw Rockbreaker: G. E. Brown.—A Visit to the De Beers Consolidated Diamond Mines: E. P. Rathbone.

FRIDAY, JANUARY 18.

ROYAL INSTITUTION, at 9.—Fifty Years of Explosives: Sir Andrew Noble, Bart., K.C.B., F.R.S.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Adjourned Discussion on Lighting of Railway Premises, Indoor and Outdoor: H. Fowler.—Eighth Report to the Alloys Research Committee: On the Properties of the Alloys of Aluminium and Copper: Prof. H. C. H. Carpenter and C. A. Edwards.

MONDAY, JANUARY 21.

VICTORIA INSTITUTE, at 4.30.—The Scriptural Idea of Miracles: Rev. Canon Girdlestone.

TUESDAY, JANUARY 22.

ROYAL INSTITUTION, at 3.—The Sculpture of Aegina in Relation to Recent Discovery: Prof. Percy Gardner.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—Annual General Meeting.—Presidential Address: The Burial Mounds and Dolmens of the Early Emperors of Japan: Prof. W. Gowland.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Internal-Combustion Engines for Marine Purposes: J. T. Milton.

WEDNESDAY, JANUARY 23.

SOCIETY OF ARTS, at 8.—The Isthmus of Panama: Philippe Bunan-Varilla.

ENTOMOLOGICAL SOCIETY, at 8.—Annual Meeting.

GEOLOGICAL SOCIETY, at 8.—The Geology of the Zambezi Basin around the Batoka Gorge (Rhodesia): G. W. Lamplugh, F.R.S. With Petrographical Notes by H. H. Thomas.

THURSDAY, JANUARY 24.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Experiments on the Dark Space in Vacuum Tubes: Sir William Crookes, F.R.S.—On a New Iron

Carbonyl, and on the Action of Light and of Heat on the Iron Carbonyls: Sir James Dewar, F.R.S., and Dr. H. O. Jones.—Note on the Application of Van der Waals's Equation to Solutions: The Earl of Berkeley.—On the Presence of Europium in Stars: J. Lunt.

ROYAL INSTITUTION, at 3.—Recent Advances in the Exploration of the Atmosphere: Dr. W. N. Shaw, F.R.S.

SOCIETY OF ARTS, at 4.30.—The Hills of Western India: Captain E. Barnes.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Investigations on Light Standards and the Present Condition of the High Voltage Glow Lamp: C. C. Paterson.

FRIDAY, JANUARY 25.

ROYAL INSTITUTION, at 9.

PHYSICAL SOCIETY, at 5.—The Strength and Behaviour of Brittle Materials under Combined Stress: W. A. Scooble.—A Spectrophotometer: F. Twyman.—Photographs of Electric Sparks: K. J. Tarrant.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Alternating-Current Commutator Motors: C. A. Ablett.

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